AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1-10. (CANCELLED)

11.(CURRENTLY AMENDED) A method for determining an exponential decay rate of a signal in the presence of noise, said method comprising:

receiving an exponentially decaying signal from a detector;

digitizing said signal to form a first array of data points;

estimating a baseline value of said signal by averaging a final fraction of said data points;

subtracting said baseline value from said first array to generate a second array;

identifying a last data point on said second array occurring before a negative or nil valued data point on said second array;

scaling an ordinate value of said last data point by a factor greater than unity to determine a new first data point for a baseline fit on said first array;

fitting remaining data on said first array to a straight line to determine an estimate for a sloping baseline and said noise;

subtracting said straight line from said data points to establish a resulting array;

identifying a last data point on said resulting array occurring before a negative or nil valued data point on said resulting array;

performing a logarithmic transformation of said resulting array up to said last data point on said resulting array; and

determining said decay rate of said signal;

wherein said noise includes broadband noise and excess low frequency noise; and

~~The method of claim 10~~ wherein said low frequency noise has spectral components having a period greater than four times a record length.

12-24 (CANCELLED)

25. (PREVIOUSLY PRESENTED)A method for determining an exponential decay rate of a signal in the presence of noise, said method comprising:

receiving an exponentially decaying signal from a detector;

digitizing said signal to form a first array of data points;

estimating a baseline value of said signal by averaging a final fraction of said data points;

subtracting said baseline value from said first array to generate a second array;

identifying a last data point on said second array occurring before a negative or nil valued data point on said second array;

scaling an ordinate value of said last data point by a factor greater than unity to determine a new first data point for a baseline fit on said first array;

fitting remaining data on said first array to a straight line to determine an estimate for a sloping baseline and said noise;

subtracting said straight line from said data points to establish a resulting array;

identifying a last data point on said resulting array occurring before a negative or nil valued data point on said resulting array;

performing a logarithmic transformation of said resulting array up to said last data point on said resulting array; and

determining said decay rate of said signal;

wherein said noise includes broadband noise and excess low frequency noise and wherein said low frequency noise has spectral components having a period greater than four times a record length.

26. (PREVIOUSLY PRESENTED)The method of claim 25 wherein said determining step includes determining said decay rate of said signal by a weighted least squares fit to said transformed data.

27. (PREVIOUSLY PRESENTED)The method of claim 26 wherein said weighted least squares fit includes weighting each transformed data point inversely proportional to a square of said value of said digitized signal minus said estimated baseline value.

28. (PREVIOUSLY PRESENTED)The method of claim 25 wherein said signal is generated in a ring-down cell.

29. (PREVIOUSLY PRESENTED)The method of claim 28 wherein said ring-down cell includes two or more mirrors in any geometry that produces a stable optical cavity.

30. (PREVIOUSLY PRESENTED)The method of claim 25 wherein said detector includes a photodector.

31. (PREVIOUSLY PRESENTED)The method of claim 25 further comprising removing transient points from said first array.

32. (PREVIOUSLY PRESENTED)The method of claim 25 wherein said subtracting a baseline value includes substracting a DC level.

33. (PREVIOUSLY PRESENTED)The method of claim 31 wherein said subtracting a baseline value includes substracting a DC level.

34. (PREVIOUSLY PRESENTED)The method of claim 28 further comprising energizing said ring-down cell.

35. (PREVIOUSLY PRESENTED)The method of claim 34 wherein said engerizing step includes utilizing a laser.

36. (PREVIOUSLY PRESENTED)The method of claim 34 wherein said laser is a continuous wave laser.

37. (PREVIOUSLY PRESENTED)The method of claim 34 wherein said laser is a pulsed laser.